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Homonymous Torsion—A Position of the Retinal Meridians heretofore Unrecognized

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HOMONYMOUS TORSION—A POSITION OF THE RETINAL MERIDIANS HERETOFORE UNRECOGNIZED.

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The study of the retinal meridians with my torsiometer [*Vide* OPHTHALMIC RECORD, May, 1898] has demonstrated great variability in their positions when the eyes are at rest and the point of regard infinity in a horizontal line. Among the cases in which the meridians were parallel there is a class, heretofore undescribed, which have an important bearing upon the study of the horopter and the normal position of the "apparent vertical meridians" of Hemholtz and the "longitudinal sections" of Hering, which I shall term the vertical meridians. Assuming the vertical meridians to be normally exactly vertical and parallel with the point of regard at a finite distance in the median plane, the vertical horopter consists of a cylinder perpendicular to the plane of the regard, whose section is a circle through the fixation point and the nodal points giving the horopter circle of Müller. Identical points of the retina are then correspondent and a unity of impression is produced. Such is the operative result of coördinating meridians and is the concomitant of binocular vision with unity of impression. This assumption demands simply that the image be received on identical points and a definite relationship of the meridians be maintained. It therefore appears possible for them to incline to the right or to the left without disturbing binocular vision, since the image will still be received upon identical retinal points. The horopter being practically unchanged at all points of fixation. The recognition of this simple truth has long been delayed, mainly through the dominants of the teachings of Hemholtz and his followers. Proceeding on these premises he constructed an horopter of convergence and mathematically demonstrated that the vertical horopter becomes a cone whose vertex is the point in which the axes of planes of the vertical meridians intersect and whose intersection of the visual plane is the circle of Müller.

By the aid of my torsiometer I have found a large number of cases showing homonymous declination of the vertical meridians both to the right and to the left. In a few the declination was considerable, amount-

ing to several degrees; yet in all there was perfect coördination, a complete sense of location and an undisturbed unity of impression. This condition I have termed *homonymous torsion;* if the declination be upward and to the right it is *right homonymous torsion;* and if upward and to the left, *left homonymous torsion.* The following illustat ive cases are, I believe, the first to be recorded:

CASE I. Mrs. O. W. aged 42. R. V.$=\frac{15}{40}$ with—1.25 D. cyl. ax. 45$=\frac{15}{15}$-L. V.$=\frac{15}{40}$ with—2 D. cyl. ax. 170°$=\frac{15}{15}$—Javal Ophthalmometer R. 1.50 ax. 120° L. 2 D. ax. 90° abduction 8°. Measurements in degrees of arc with Stevens' tropometer R. up 32°, down 55°, in 55°, out 55°. L. up 30°, down 60°, in 70°, out 60°. Torsiometer measurements indicating the torsional power. *Right vertical meridians+6° of arc left meridian vertical, right vertical meridian—2° of arc left meridian vertical. Left vertical meridian+7° of arc left meridian vertical. Left vertical meridian—2° of arc left meridian vertical.

The position of the vertical meridians when the eyes were disassociated by a prism and adjusted to a seemingly erect and a parallel position was upward and inward for the right eye and upward and outward for the left eye, each having a declination of six degrees. This condition of left homonymous torsion I express as follows: R. V. M.—6°$\supset$L. V. M.+6°. Repeated and control tests made as described in the articles before referred, gave uniform results.

CASE II. H. O. L. aged 13. R. V.$=\frac{15}{15}$—with+0.25 D. cyl. ax. 90°$=\frac{15}{15}$ L. V.$=\frac{15}{15}$—with+0.25 D. cyl. ax. 90°$=\frac{15}{15}$+. Javal Ophthalmometer R. 0. 50 D. ax. 90° L. 0.50 D. ax. 90° Abduction 5° Sursumduction right 1° left 1° Exophoria 1½° at infinity. O. at occupation distance. Stevens' Tropometer R. up 30°, down 45°, in 50°, out 45°. L. up 30°, down 45°, in 50°, out 50°. Torsiometer R. V. M.+5° L. V. M.+4° R. V. M.—2° L. V. M.—3°. Left homonymous torsion of 4°. The vertical meridians giving the reading R. V. M.—4°$\supset$L. V. M.+4°.

CASE III. S. C. aged 19. R. V.$=\frac{15}{50}$ with—1.50 D.$\supset$—0.50 D. cyl. ax. 90°$=\frac{15}{15}$ L. V.$=\frac{15}{50}$ with—1.50 D.$\supset$—0.25 D. cyl. ax. 90°$=\frac{15}{15}$. Javal Ophthalmometer R. 0.25 D. ax. 90° L. 0.50 D. ax. 90° Abduction 8° Sursumduction right 2° left 2° =Esophoria 2° at infinity. O. at occupation distance Tropometer R. up 35°, down 45°, in 60°, out 40°. L. up 33°, down 40°, in 50°, out 50°. Torsiometer R. V. M.+5° L. V. M.+5° R. V. M.—3° L. V. M.—3°. Left homonymous torsion of 3° R. V. M.—3°$\supset$L. V. M.+4°.

CASE IV. Mrs. J. C. aged 37. R. V.$=\frac{15}{200}$ with+1.50 D. cyl. ax. 110°$=\frac{15}{40}$ L. V.$=\frac{15}{15}$ with+0.50 D. cyl. ax. 80°$=\frac{15}{15}$+. Javal Ophthalmometer. R. 4 D. ax. 110° L. 1 D. ax. 80°. Abduction 5° Tropometer R. up 30°, down 43°, in 50°, out 42°. L. up 30°, down 45°, in 50°, out 40°. Torsiometer R. V. M.+2° L. V. M.+2° R. V. M. —3° L. V. M.—4°. Left homonymous torsion of 1° R. V. M.—1°$\supset$L. V. M.+1°.

CASE V. J. H. aged 35. R. V.$=\frac{15}{100}$ with—2 D. cyl ax. 180°$=\frac{15}{15}$ L. V.$=\frac{15}{200}$ with—2 D. cyl. ax. 180°$=\frac{15}{15}$. Abduction 6° Esophoria 2½° at infinity. Exopho-

*Hereafter I shall designate the right or left vertical meridian as R. or L. V. M., as the case may be, the complementary meridian being always exactly vertical, unless otherwise stated.

ria 3° at occupation distance. No hyperphoria. Tropometer R. up 30°, down 40°, in 45°, out 40°. L. up 28°, down 40°, in 45°, out 40°. Left homonymous torsion of 2° R. V. M.—2°⊂L. V. M.+2°.

Case VI. M. W. J. aged 44. R.=$\frac{15}{20}$ with+0.50 D.⊂+0.50 D. cyl. ax. 90°=$\frac{15}{15}$ L.=$\frac{15}{20}$+0.50 D.⊂+0.50 D. cyl. ax. 90°=$\frac{15}{15}$. Javal Ophthalmometer R. 0.75 D ax. 100° L. 0.50 D. ax. 90° Abduction 8° Left hyperphoria 1½° Tropometer R. up 33°, down 47°, in 55°, out 50°. L. up 33°, down 43°, in 50°, out 50°. Torsiometer R. V. M.+7° L. V. M.+8° R. V. M.—0° L. V. M.—0°. Left homonymous torsion of 3° R. V. M.—3°⊂L. V. M.+3°.

Case VII. T. B. aged 53. R. V.=$\frac{15}{100}$ with+1.50 D.=$\frac{15}{15}$ L. V.=$\frac{15}{70}$ with+1 D.⊂+0.75 D cyl. ax. 90°=$\frac{15}{40}$. Javal Ophthalmometer R. 0.50 D. ax. 180 L. 0.75 D. ax. 180. Abduction 7°, Exophoria 1°, Right hyperphoria ½°. Tropometer R. up 30°, down 50°, in 50°, out 50°. L. up 30°, down 50°, in 50°, out 40°. R. V. M.+5° L. V. M.+5° R. V. M.—5° L. V. M.—3° Left homonymous torsion of 2° R. V. M.—2° ⊂L. V. M.+2°.

Case VIII. J. D. aged 28. R. V.=$\frac{15}{70}$ with—2.75 D. cyl. ax. 165°=$\frac{15}{40}$ L. V.=$\frac{15}{70}$ with—3.50 D. cyl. ax. 10°=$\frac{15}{40}$. Javal Ophthalmometer R. 3 D. ax. 75° L. 4 D. ax. 100°. Abduction 8°, Exophoria 4°. Tropometer R. up 27°, down 45°, in 50°, out 40°. L. up 25°, down 45°, in 48°, out 40°. Torsiometer R. V. M.+3° L. V. M.+4° R. V. M. —3° L. V. M.—2° Left homonymous torsion of 4° R. V. M.—4°⊂L. V. M.+4°.

Case IX. E. A. T. aged 42. R. V.=$\frac{15}{50}$ with+2 D.=$\frac{15}{15}$ L. V.=$\frac{15}{70}$ with+1.50 D.⊂+1 D. cyl. ax. 70°=$\frac{15}{15}$ Esophoria 2° at infinity, the same at occupation distance. Javal Ophthalmometer R. 0.25 D. ax. 80° L. 1.25 D. ax. 70°. Abduction 8°. Tropometer R. up 32°, down 45°, in 55°, out 50°. L. up 32°, down 45°, in 60° out 50°. Torsiometer R.V. M.+2½° L. V. M.—5°=torsion R.V.M.—2½° L. V. M.—0°. Left homonymous torsion of 2½°, combined with a plus torsion of two degrees in the left eye. The formula expressing the condition and represents tne position of meredians when disassociated is as follows: R. V. M.—2½°⊂L. V. M.+5°.

Case X. N. W. I. aged 48. R. V.=$\frac{15}{20}$ with+1 D.=$\frac{15}{15}$ L. V.=$\frac{15}{20}$ with+1 D.=$\frac{15}{15}$. Javal Ophthalmometer R. 0. L. 0.50 ax. 90°. Abduction 3°. Esophoria 3½° Left hyperphoria 1°. Tropometer R. up 32°, down 45°, in 50°, out 40°. L. up 33°, down 45°, in 50°, out 40°. Torsiometer R. V. M.+5° L. V. M.+5°=Torsion R. V. M.—3° L. V. M.—3°. Right homonymous torsion when the vertical meridians were disassociated: R. V. M.+2°⊂L. V. M.—2°